

MINDANAO



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With Our Own Hands: Experiences in Promoting Ecological Sanitation and Food Security in Mindanao

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The Water, Agroforestry, Nutrition and Development Foundation (www.wandphilsorg.com) promotes and implements social development initiatives focused on the improvement of the environment and the agriculture sector, rural entrepreneurship, ecological sanitation and peace-building.

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Foreword

The publication “*With our Own Hands: Experiences in Promoting Ecological Sanitation and Food Security in Mindanao*” is great; it is appropriate and timely. It is all these because we now have a practical guide for those in need of proper sanitation without going far and wide and spending so much to obtain necessary materials to build a clean, safe and decent toilet. Building a proper toilet is now affordable, socially and culturally acceptable and therefore sustainable at the household and community level. The importance of this publication should not be taken for granted because there are more than 20 million Filipinos suffering the indignities and health hazards of not having access to proper sanitation. This book is aimed to address the needs of the base of the pyramid (BoP), the households who are too poor to afford their own toilets, those in remote areas un-served by government services, those with inadequate or do not have adequate supply of clean water, and those in conflict and disaster-hit areas. This field guide can now put a stop to the old and oftentimes, inappropriate practice of doling out pour-flush toilet bowls by government and donor organizations despite the fact that they are well meaning.

This publication will also benefit sanitation professionals as it presents new knowledge available at the tip of the fingers of sanitation advocates, promoters and practitioners. There is new knowledge in this manual on Ecosan approaches and technologies. And true to the principles of Ecological Sanitation, it promotes the safe reuse of human urine and feces as fertilizers, a key feature in sustainable sanitation. If distributed widely and used adequately, it can greatly advance our efforts in trying to meet our MDG target for sanitation by 2015.

It is a milestone in the sanitation movement in the Philippines.

On behalf of the Center for Advanced Philippine Studies (CAPS) and the Philippine Ecosan Network (PEN), I would like to congratulate Dr. Elmer V. Sayre and Jed Christian Z. Sayre and other partners in writing this publication which I know for a fact embodies their commitment, sacrifices and life's work to help the BoP attain healthy lives and healthy environment and sufficiency in food supply.

Dan Lapid

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Many thanks to Peter Wychodil of the German Doctors for Developing Countries for introducing us to the world of ecological sanitation and providing us the funding for the construction of pilot UDD toilets. Thanks too to Robert Holmer of Xavier University now with the Asian Vegetable Research and Development Centre for providing me with the double-vault design which I used in starting up. I also offer sincere thanks and gratitude to Robert Gensch, Gina Itchon, Analiza Miso and Dexter Lo of Xavier University for their collaboration and continuing support. Thanks too to Dan Lapid, Arvi Miguel, Bert Serrano and Felix Lapuz of the CAPS for their continuing support and encouragement. I also wish to thank the people at the Science and Technology Innovations for the Base of the Pyramid in Southeast Asia (iBoP-Asia) most especially Antonio G.M. La Viña, J.S.D., Dean, Ateneo School of Government and Director, iBoP-Asia Project and Lorenzo Cordova, Jr., Marien Nilo and Mary Grace Santos for their generous support and encouragement during the ecosan design research. I also wish to thank the WAND Foundation fieldworkers, unsung heroes in development namely Leo Cabillan, May Grace Maboloc, Aries Quince, Arnel Jabagat, Jade F. Alipoyo, Giovanni Yangyang, Isagani Delima, Annie Jane Lagawan and Maribel Maboloc. Thanks too for my co-scholars-in-residence at the Rockefeller Center in Bellagio, Italy of whom I spent countless enchanted days in July-August 2010. Our discussions about the problems in the Philippines especially on health, sanitation and poverty provided me fresh perspective and inspired me to write. Thanks too for the many generous donors, individuals and institutions that have provided funding in order for me to expand my ecosan and food security initiative in three provinces in Mindanao. The institutions are, Ateneo de Manila School of Government and the International Development Research Center via the Science and Technology Innovations for the Base of the Pyramid in Southeast Asia (iBoP-Asia), the German Doctors for Developing Countries, Broederlijk Delen, the German Embassy in Manila and the Australian Direct Action Program. The individuals are Christophe Elain in France, the Tielu's in Australia, Evren Sinar in Germany, Dr. Fausto Gumato, David Sperow, Briana Ratterman and Jason Steele in the United States, Jonalyn C. Kaegi in Switzerland and Johan Mayeur in Belgium. Thanks too to my sister Maria Eva S. Edon, English Coordinator at the Department of Education for editing the manuscript. Finally may I offer my sincere thanks to my wife Cora for being my partner in this exciting journey to seek some sustainable solutions to the problems of health, sanitation and food security faced by the poor.

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Special word of gratitude

I am thankful to the Swedish International Development Cooperation Agency (SIDA) for funding the participation of Cora Z. Sayre, the Executive Director of the WAND Foundation, to the International Course on Ecological Sanitation held in Sweden in September 2008 and in India in April 2009 and to the Stockholm Environment Institute (SEI) in Sweden for conducting the course. Jan-Olof Drangert, Programme Director, Solveig Nilsson, Programme Administrator and Björn Vinnerås of the SEI provided Cora with insights about ecological sanitation during and even after the course. The six months period between the two courses was devoted to Cora's ecosan field initiatives at the WAND Foundation with the results serving as material for my iBoP-Asia research and of which most of the contents of this book is based.

Elmer V. Sayre

Chapter 1:

Background

I must confess that I am an ecological sanitation (ecosan) champion of sorts, promoting ecosan mostly in Mindanao where my work is concentrated. I write, sleep and talk about it and I imagine any situation where a urine diverting dehydration (UDD) toilet (or simply “ecosan toilet”), especially for the poorest of the poor is applicable. Thus over the years, I have designed and developed UDD toilets for farmers, UDD toilets for coastal folks, even UDD toilets for toddlers and persons with disabilities. But talking about “closing the loop” and re-using ones feces and urine to fertilize the plants create vehement opposition by some, disgust and sickness to others and incredulity by friends. One acquaintance from far Australia even chided me by saying, “What Elmer? That is GROSS!” “No wonder people are getting sick with their vegetables fertilized with feces!”

When I delivered a paper at a conference for water and sanitation in Kuala Lumpur in 2009, a lady from Indonesia insisted that the hormones in ones’ feces will contaminate the food and kill people. After my paper she came to me to give me her address so that we can continue the debate in a long distance manner. However, with the rural folks, it is different- in so many meetings and discussions with them, the question is always, “if we adopt it, how do we do it?” Apparently there is no question of its “grossness” since the poor, without proper sanitation simply do not have any choice.

So this publication is an attempt to illustrate how ecological sanitation is done, as experienced by the Water, Agro-forestry, Nutrition and Development Foundation or WAND, an NGO where I am the in-house adviser, its allied organizations like the Association of Locally-Empowered Youth in Northern Mindanao (ALEY-NM) headed by my son Jed Christian.

Our work in ecological sanitation with the WAND is still “work-in-progress” as many things are still being discovered and pilot-tested, hence this publication is expected to be updated in a regular manner. One of this is the use of lacto-fermentation in order to prevent smell and the use of charcoal-sawdust mix in order to produce high-grade fertilizer. This work is not meant to compete with that done by Peter Morgan (Toilets that Make Compost, 2007) in the African context as this will simply try to explain ecological sanitation in the Philippine setting, with Filipinos as the audience in mind. However if other countries and cultures will find this useful, why not? There is never any monopoly to knowledge especially if it means helping the poor and the downtrodden.

Starting Point

I started my adventure into the world of ecological sanitation in 2007 when the idea of “closing the loop” was first introduced by one of our partners, the German Doctors for Developing Countries based in Frankfurt. In one of the visits of its Project Officer, Mr. Peter Wychodil, he brought with him a piece of paper with some diagrams of a double vault urine diverting dehydration toilet (UDDT). The diagram was not very clear but it has a contact web address that allowed me to conduct a search and came in contact with Ms. Ulrike Lipkow, a German technical expert from GTZ who has an ecosan project in the Visayas promoting ecosan. I got also some information that a nearby university in Cagayan de Oro is promoting ecosan with their peri-urban gardening project.

With this serendipitous confluence of events, our ecosan project came into being and well on its way to offer some solution to the pollution and unmitigated spread of diseases in Mindanao due to open defecation and the improper disposal of human excreta. Our project is not only relevant in our locality because on the whole, 90% of the sewage generated in the Philippines is not disposed or treated in an environmentally acceptable manner and diarrhea is top 3 major cause of death especially among children.

When I started implementing ecological sanitation primarily by constructing double-vault UDDT's I quickly realized that the double-vault system costing 25,000- 30,000 pesos per unit is unaffordable by the base of the pyramid (BoP) or the bottom poor. It has its applicability in schools and in communal areas such as barrio centers and offices but because the cost in constructing one is very high, scaling-up becomes difficult given the budget constraints in most schools and barrio centers. There is also the problem of meeting the needs of the bottom poor, who are the main target of our ecological sanitation effort and where the double-vault toilet is clearly not an option cost-wise. Thus I embarked on a search to find different ecosan designs that will fit different situations from hilly farming areas, to coastal zones and in slums or densely populated centers and one that can be used during emergencies.

I also embarked on designing specialized ecosan toilets for persons with disabilities as well as for toddlers. My EcoPee is the simplest design of all and is useful in collecting urine to be used as fertilizer. The research and testing the designs with local farmers and fishermen is funded by a grant from the Science and Technology Innovations for the Base of the Pyramid in Southeast Asia (iBoP-Asia) grant. Pilot-testing is much needed in order to determine socio-cultural acceptability, economics and to determine the robustness of the units.

What is ecological sanitation?

From the website of a supporter, Christophe Elain, who is active in promoting ecological sanitation in France, I found this entry;

The concept Ecological Sanitation or simply ecosan is based on the fact that sanitation problems could be solved in a more sustainable manner and efficiently if the nutrients contained in excreta and wastewater were recycled and reused rather than being released into the environment (groundwater aquifers, rivers and other outlets).

The sanitation systems used today are based on the misinterpretation that human excreta are a waste of limited use which must be disposed of.

Ecosan is a new paradigm which deemed clean human excreta and waste water as resources that can be recycled, treated and reused in a healthy way.



Figure 1: Closing the loop between sanitation and food production. Although the labels/texts are in French it can be easily understood.

Ideally, processes of ecosan allow full recycling of nutrients from sewage, feces and urine and their reuse in agriculture.

In this way, they help to maintain soil fertility and consequently produce food in the long term while reducing consumption and pollution of water resources. You can find a wealth of literature mainly in English at www.ecosanres.org and at www.susana.org. Ecological sanitation or the use of human excreta has been with us for a long, long time. The following bullets are evidence to it (cited in Wikipedia);

- ✓ Practiced by the ancients and by almost all cultures.
- ✓ The Romans used urine as disinfectant and for washing.
- ✓ The Chinese used human excreta for fertilizer since 500 B.C.
- ✓ In Yemen elaborate systems were developed in urban centers enabling the separation of urine and excreta even in multi-story buildings.
- ✓ In Peru, the Incas had a high regard for excreta as a fertilizer, which was stored, dried and pulverized to be utilized when planting corn.
- ✓ Sweden is the pioneer starting in 1980s in doing ecosan research and demonstration projects.
- ✓ In the Philippines, the Center for Advanced Philippines Studies (CAPS) pioneered work in ecological sanitation.

Our progress to date

Our activities always start with a soft launch and little publicity on the ground. We want to keep it this way in order to save on cost with the savings better spent on ecosan hardware. The publicity we do is via the internet by telling friends and the public about what we do and by submitting articles and case studies to newsletters such as the Water and Solid Waste and other venues such as the Center for Applied Philippine Studies (CAPS) and at the Sustainable Sanitation Alliance website (www.susana.org). Our soft launching is often held at the WAND Foundation training center in Libertad with most of the staff and farmer leaders attending. Aside from publicity we also make it a point to visit other ecosan practitioners in the field in order to learn from them and to exchange notes. For example on November 5-8, 2009, I visited the ecosan implementation in San Fernando, La Union. San Fernando is the first area where ecosan was implemented with the leadership of the CAPS. The city ENRO of San Fernando and the CAPS facilitated the visit. I also visited the ecosan implementation of Xavier University in Cagayan de Oro City and gained insights from their implementation there.

In the year 2008, we were able to build a total of 17 double-vault ecosan toilets mainly with funding support coming from the German Doctors for Developing Countries. The German Doctors is one of our long-term partners. They get their funding to support NGOs in Asia from the German Federal Ministry of Economic Cooperation and numerous individual donors. These double-vault ecosan toilets were primarily located in the elementary schools in the municipalities of Initao, Libertad and Manticao and in the office of WAND Foundation. Then in the same year, a partner NGO based in Dipolog City called Asset-Based Community Development with Equity Foundation (ABCDEF) built 16 double-vault ecosan toilets in the municipality of Katipunan, Zamboanga de Norte and in Dipolog City with the same support coming from the German Doctors.

While the double-vault toilets established, I started thinking of designing really low-cost units when the main criticism that came to us is that our UDD toilets may be useful and groundbreaking but it is not replicable. Accordingly, very few will pay for a 28,000- peso toilet, our critics say which I think is true. If we remain donor dependent then this is the way to go but we want to move in the direction of sustainability and independence. It does not look good if we remain paupers and yet telegraph to our beneficiaries the idea of standing on their own bootstraps!

In November of 2009 I joined a competition sponsored by the Ateneo de Manila School of Government with funding from the International Development Research Center (IDRC) based in Canada. Their project is called Science and Technology Innovations from the Base of the Pyramid in Southeast Asia (iBoP-Asia). My competition piece was basically to conduct a research on alternatives to the double-vault ecosan system. Fortunately I was one of the winners in this competition thus providing me with much-needed resources that leads me to the world of low-cost ecosan systems.

I considered a lot of factors in my design namely socio-cultural acceptability, ease in constructing the units, economics and aesthetics. In my designs, I used bamboo, wood poles, coconut fronds, coconut lumber and recycled plastics and drums. The new designs were field-tested in Barrio Oguis in Initao and Barrio Tuod in Manticao. One new design appropriate for coastal communities where space is difficult and houses are close to each other is a “hanging” type of ecosan and we field tested this in Initao Poblacion. A total of 95 ecosan designs comprising 65 arborloo, 21 single-vault and 4 hanging ecosan were established with the iBoP beneficiaries.

Social and cultural acceptability was found to be high. Local beneficiaries were able to use, manage and take good care of the pilot units with no problem at all. All of the beneficiaries are poor farmers and fishermen. Most of the materials used in the designs were locally sourced such as bamboo, coconut palm fronds, wooden

poles, gmelina wood and rattan baskets. Recycled drums, containers, black plastic sheets and heavy-duty Manila hemp sacks were sourced from a junk store in Cagayan de Oro. The special ecosan bowl is produced by our local masons. The result is a much-reduced cost of an ecosan toilet.

Part of my aim is to properly use the feces and urine that we collected for agriculture since issues related to it is mainly focused on health and contamination. With the urine use, I am preparing to do a study on urine re-use in collaboration with Xavier University. Human urine is a valuable source of nutrients and properly sanitized urine can be considered an effective liquid fertilizer in agricultural production. Big shares of the soluble substances in urine are essential plant nutrients like Nitrogen (N), Phosphorus (P) and Potassium (K). The nutrient amount in human urine is dependent on the local diet and almost all of the nutrients consumed with the daily food intake leave the human body again with the excreta (Jönsson et al. 2004). Urine contains most of these macronutrients as well as smaller fractions of micronutrients in a plant available form and is particularly rich in Nitrogen.

Urine can therefore be considered a well-balanced nitrogen rich liquid fertilizer. This study will therefore investigate the average nutrient content in human urine coming from different areas in the Philippines as well as appropriate urine application levels for different representative vegetable crops for 4 different areas in the Philippines in order to address this knowledge gap.

For the secondary treatment of feces we developed a vermi-compost facility in our demonstration farm in Libertad. Previous studies done at Xavier University showed that the ascaris in feces is not destroyed in 6-8 months of storing feces in the ecosan vault hence the need to include secondary treatment in the vermi-compost. Aside from being a secondary treatment for collected feces, the vermi-compost is a good source of organic fertilizer and soil conditioner for the plants. Our lands here are already degraded and an application of soil conditioner to improve land aeration and capillarity is very important.

During this exciting phase in my work, I did not lack visitors. For example, I facilitated a visit of 2 German ecosan experts Drs. Otterpohl and Ricken and they conducted practical training on the Terra Preta technology. Terra Preta (literally black soil) transforms feces and urine into high-class fertilizer with the introduction of several strains of bacillus. We are now culturing the bacillus mix and we have started the Terra Preta initiative with the aim to market the high-class fertilizer to garden enthusiasts and tree growers.

Micro-financing ecosan

I am starting to integrate the ecosan initiative into the micro-finance division of the WAND Foundation under a special window for ecosan toilet loans for the base of the pyramid. Micro-financing as a strategy for the WAND Foundation started only in 2009 when I realized that there is a pressing need to systematize repayments to the numerous inputs we have already released to our farmer-beneficiaries since 2003 when we started work in Misamis Oriental. These inputs include farm animals, land redemption support, tree planting, small water system projects among others.

I must say that micro-financing ecosan is not an easy task and is fraught with a lot of challenges and frustrations. First and foremost is the relative newness of the technology and systems. Second problem is that our piloting stage in which we provide the ecosan toilets for free to the beneficiaries have its unintended effect – other people want it for free too! Then there is the continuing insistence of government agencies to provide pour-flush toilet bowls. Finally there is the issue of extreme poverty itself which I think is the main stumbling block. Getting a loan for a toilet is the last thing that the poor will do and a loan if there is one is better spent to buy food, send children to school or buy home amenities. This is understandable and utterly logical. Cajoling the toilet-less poor or even threatening them to construct their toilets is out of the question.

Being faced with this problem did not deter us from starting ecosan toilet micro-financing. Our advantage is that we have for several years now, developed a beneficiary base of about 2,000 farmers located in 5 municipalities of west Misamis Oriental. These beneficiaries comprise the poorest of the poor and therefore appropriate for ecosan micro-financing implementation. It is helping also that my wife Cora who directs the activities of the WAND Foundation is a municipal councilor in Initao and my son Jed Christian is a municipal councilor in Libertad. The two of them provided my entry into the policy-level arrangements of ecological sanitation in the two municipalities. For example in Initao Municipality, I succeeded in putting ecosan as one of the solutions to sanitation in 1 barrrio (Oguis). In Libertad, our implementation is smoothened with the direct participation of the health officers and barrio health workers in the municipality. It helps too that the Municipal Mayor in Libertad is a medical doctor.

Our approach is a soft one, that is, we offer ecosan toilet micro-financing as one among the menu of loan products the prospective loaner can get. Our loan products include large and small animals, land redemption, cash loan for small enterprises, loans for small farm tools and ecosan toilet. When a beneficiary applies for a loan, then we make the availability of toilet as one of the requirements and if the applicant does not have one, a toilet is included in the package. This is only true in bigger loan amounts but for the ultra-micro loans (1,500 pesos), this criterion is not included.

So far our ecosan initiative has resulted in the following:

- a. The localization and popularization of ecosan technologies are put into practice with the successful implementation of different designs ranging from the “hanging” ecosan toilet for coastal communities, lightweight arborloo toilets for mountain areas, single-vault ecosan toilets for households and those that are to be used during emergencies and the fabrication of urinals or EcoPees.
- b. The designs were done at the WAND Foundation demonstration area in Libertad and pilot-tested in several areas namely Barrio Tuod in Manticao municipality, Barrio Oguis in Initao and the hanging ecosan in a coastal area in Initao municipality. Social and cultural acceptability was found to be high. Local beneficiaries were able to use, manage and take good care of the pilot units with no problem at all. All of the beneficiaries are poor farmers and fishermen. Most of the materials used in the designs were locally sourced such as bamboo, coconut palm fronds, wooden poles, gmelina wood and rattan baskets. Recycled drums, containers, black plastic sheets and heavy-duty Manila hemp sacks were sourced from a junk store in Cagayan de Oro. The special ecosan bowl is produced by our local masons. The result is a much-reduced cost of an ecosan toilet.



Photo 1: This is what a “toilet” usually looks like in poor rural households. It is indecent, odorous, unsanitary and breeding ground for flies. Another alternative is for the rural folks to just defecate in the open ground.

Chapter 2:

Ecological Sanitation Designs

Common Materials in Ecosan Construction:



Photo 2: 200-liter steel drum cut in half and fitted with a handle and is used mainly to store feces



Photo 3: Alternate to the drum is a rattan basket used to store feces.

Other materials include recycled Manila hemp sack, wood, poles, coconut lumber, nipa or coconut palm for roofing and garbage bag. Heavy Manila hemp sack is placed inside the drum or rattan basket so that the stored feces for easy harvest. Sacks cost at 8 pesos each in a recycling store in Cagayan de Oro City.

An ordinary black garbage bag is lined at the sack in order to prevent seepage of the fecal material contained therein. During harvest of the feces, it is the garbage bag that is removed and the sack will remain in the basket or drum.

Note that recycled 200-liter drums can serve a variety of purposes, eg. as urine collectors, rainwater and grey-water collectors and so on.



Photo 4: Our ecosan bowl is made of cement, sand and gravel reinforced with wire. The mold used to form the toilet bowl is also made of cement. One bag of cement can produce 6 of these bowls.

It is noteworthy to say that our production of ecosan bowls made of reinforced concrete is considered a ‘first’ in Mindanao or even in the whole country. We used to purchase the bowls made of ceramic from Luzon but we found this to be difficult and expensive. The cost of the bowl is at 950 pesos from the source but this doubles when it arrives here in our place because of the cost of taxes, shipping, handling, etc.



Photo 5: Ecosan toilet bowl production site in Libertad, Misamis Oriental. The production area is located in a 6-hectare farm demo area of the WAND Foundation.

Aside from the cement ecosan toilet bowl (sitting-type) we also produce wooden squat-type bowl because some people prefer the squat-type bowl.



Photo 6: View of the wooden ecosan squat bowl.

Different Ecosan Designs

A. Double vault Ecosan

Technical details:

Floor area: 2.00 m x 1.50 m

Floor Elevation: 0.9 m

Ventilation pipe: diameter 2 inch, PVC

Urinal pipe: diameter 1 inch

16 L plastic container and 200 L plastic drums for collection and storage of urine

Roof: thatched roof (made of nipa leaves) or corrugated sheet roof

For the feces vault door, galvanized steel is used painted in black to increase the absorption of heat from the sunlight.

The feces vault is about 1 m x 1.5 m in floor area and 1 m high (1.5 m³ volume).

Four 4-inch x 4-inch coconut wood for the posts in the 4 corners of the toilet.
Feces covering material is mainly ash.

Double-vault urine-diversion dehydration toilets (UDDTs) are used for the collection of faeces and urine. Once the first vault is full (after approximately one year), the second vault is used by transferring the UDD bowl. Ash is used for covering material for the feces. In some areas, they use a 1:1 mix of sawdust and lime is used.

The waterless urinal for men is a modified plastic container used normally for drinking water since those are very cheap compared to ceramic urinals. One side of the container is cut in a “U” shape and it is connected with a pipe at the bottom.

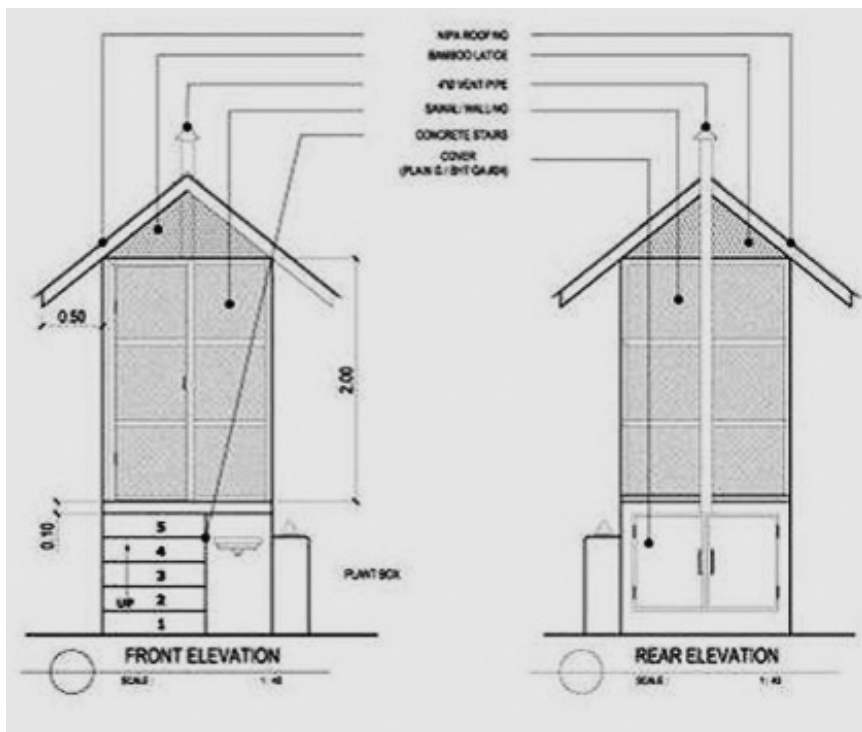


Figure 2: Design drawings for double-vault UDD toilets – Part 1 of 2 (design drawings provided by Dr. Holmer from PuVep, see <http://puvep.xu.edu.ph>)

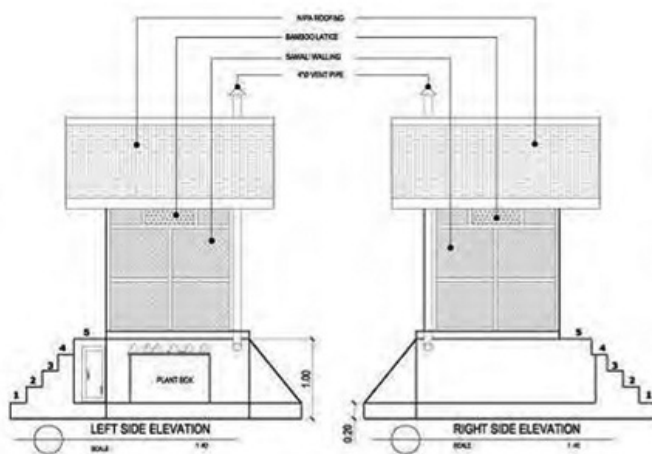


Figure 3: Design drawings for double-vault UDD toilets – Part 2 of 2 (design drawings provided by Dr. Holmer from PuVep, see <http://puvep.xu.edu.ph>)



Photo 7: Two double-vault ecosan toilets located in Tuod Elementary School, Manticao, Misamis Oriental. Urine fertilizer is used by the school children in the vegetable and flowers surrounding the school.

In schools we recommend the building of 2 double-vaults, one for males and one for females. Before the double-vault ecosan toilets are used, we conduct orientation among the teachers and those who are assigned to take care of the toilets. The orientation focused on cleaning, maintenance, proper use and the most common problems that may happen while using the toilet. We also produce and distribute simple 1-page flyers that details in simple terms instruction on how to use the toilets. Usually one teacher is assigned by the school head to oversee the use of the toilet. In one school I visited one teacher devised a grading system wherein regular ecosan users get much higher grade in one subject thereby encouraging the children to use the toilets.

Materials needed for a double-vault ecosan:

Concrete Hollow Blocks	300 pieces	Steel Bars	30 pcs 8 mm
Cement	25 sacks	Tie Wire	3 kilos
Nails # ½	5 kilos	Nails # 4	6 kilos
PVC Pipes	4 pcs	PVC Elbow	6 pcs
PVC Tee	5 pcs	Solvent	4 cans
Coco lumber	220 bd. ft.	Gmelina lumber	175 bd. ft.
Plywood	6 pieces	G.I. Sheets	5 pieces
Sand and gravel	3 loads	Tiles for the cabin	160 pieces
Nipa	200 pieces	Bamboo	5 poles
Ecosan bowl	1 bowl	200-liter drums	2 pieces

Note that some of the materials such as coconut lumber and gmelina wood can be replaced with whatever is available in the area. The tile for the cabin is not really necessary but is desirable. Nipa and plywood can be replaced with more cheap materials such as coconut palm and bamboo slats (amakan).

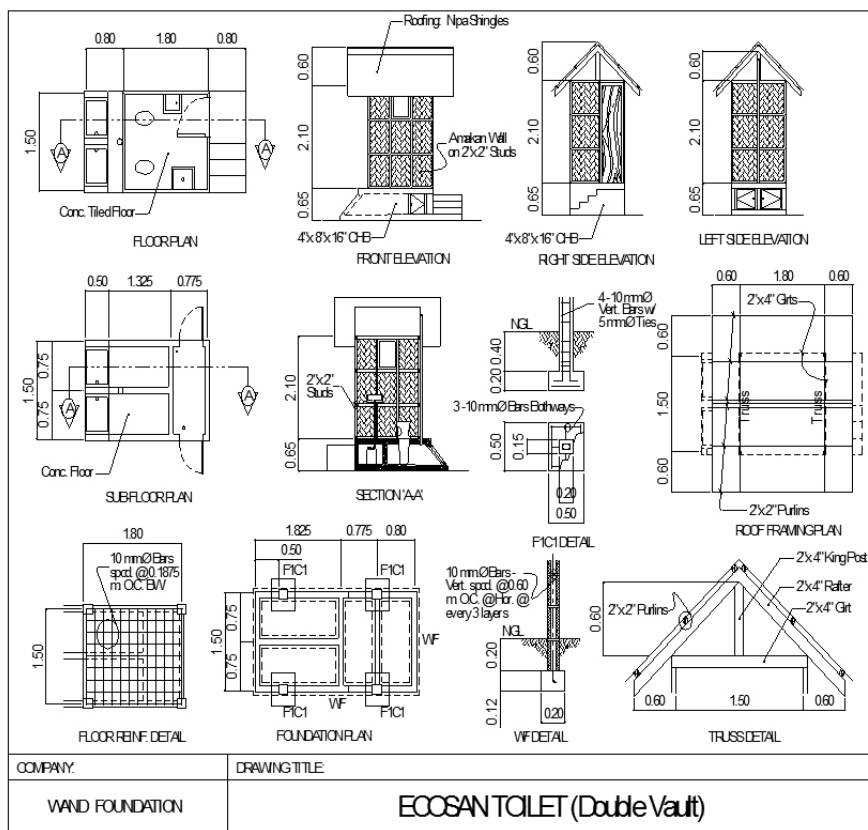


Figure 4. Schematic drawing of a double-vault ecosan toilet.

B. Arborloo

Arborloo toilets or literally “tree toilets” is perfect in upland where water is scarce. I posit that frequent long dry spell and aridity as a result of climate change and the decimation of the forest areas is a form of creeping emergency already. In this situation some aid agencies and local governments still distribute ordinary toilet bowls for use by local inhabitants only to wonder later on why the bowls are not used and are just left lying around or are used as flower pots. This is simply because there is no more water available to flush this type of toilets.

Our design of an arborloo toilet is copied after that of Morgan, 2007, Toilets that Make Compost. The arborloo is a variation of a pit latrine only that the cover-slab, the toilet bowl and the superstructure is transferable when the pit is filled. When the pit is filled, it is covered with soil and other organic materials such as animal manure and trees or clumps of bananas are planted over it. This is ideal in waterless mountain sites with dispersed communities. We have field-tested 95 arborloo toilets with local families in the municipalities of Libertad, Manticao and Initao and social and cultural acceptability is high, simply because this is just a variation of the open pit latrine which they are already accustomed to, only that this time, human excreta is covered with soil and ash, so no flies and no odor emanates and the resulting fertile pit planted with trees.

Local materials are used consisting of cement for the superstructure and toilet bowl and palm fronds, bamboo and poles for the superstructure. One arborloo costs around 300 to 750 pesos. When the pit is full, the whole toilet is then transferred to a nearby area, ideally at a distance of 10 meters per pit for fruit bearing trees but less if planted with timber trees or bananas. The process of transferring the arborloo continues on around the farm until a tree plantation is established.

Our sustainable arborloo sanitation system is economically viable, socially acceptable and institutionally appropriate as well as it helps protect the environment and improve biodiversity. Economically viable because it uses local materials and construction and deployment is simple. Socially and culturally acceptable because it is only an improvement to the open-pit latrine which the local people are accustomed in using. Institutionally appropriate because it fits well to the sanitation agenda of local government units or NGOs operating in an area. It protects the environment and natural resources because the resulting trees planted over highly fertilized land where the arborloo is located ensures good growth. The system is robust and will last for 5-10 years. There is very little health and hygiene risk because there is no exposure to feces which contains pathogens. It is innovative because we are already finding solution to water scarcity caused by climate change.

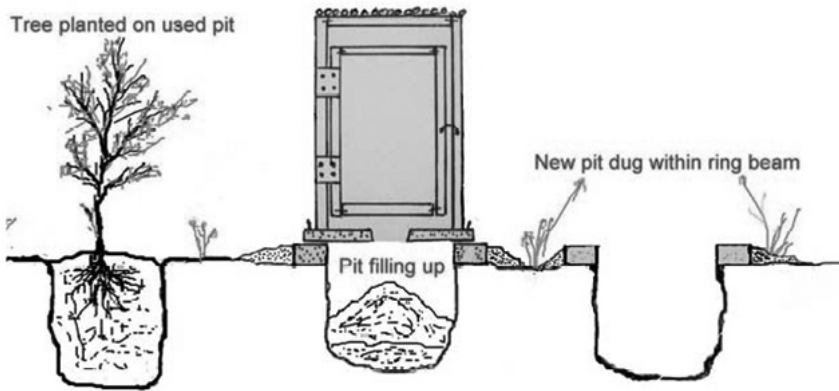


Figure 5: Schematic diagram of arborloo toilet. From Peter Morgan's, *Toilets that Make Compost* (2007).

Technical details:

- a. Floor area: 1.5 m x 1.5 m
- b. Urinal pipe: diameter ½ inch. Note: simple arborloo does not need any urinal pipe.
- c. 16 L plastic container and 200 L plastic drums for collection and storage of urine.
- d. Alternately an EcoPee is used to collect urine.
- e. Roof: thatched roof (made of nipa leaves) or corrugated sheet roof

When we started making the arborloo toilets, our cover-slab was made of cement reinforced with iron re-bars. Later on we found out that the cement cover-slab is simply too heavy and difficult to transport in rugged terrain. In our experience, 6-8 people are needed in order to carry 1 cover-slab. So as an alternative we designed a simple, lightweight arborloo cover-slab made of wooden poles and bamboo flooring. This type is very effective in hilly areas and in places where there are no more roads and transport is difficult. This arborloo can also be made directly in the site using locally-available materials.



Photo 8: An arborloo cover-slab made of wood poles and bamboo flooring. This is lightweight and appropriate in mountain areas. Two persons or a draft animal can easily carry this. This type of arborloo has urine separation unit.

Some of the beneficiaries place sack or recycled plastic to cover the floor and to prevent odor. Instead of ash, the user places soil to cover the feces. Waste tissue paper and other wiping materials are placed directly on the pit and are also covered with soil. In my experience, the pit should not be too deep so that the arborloo can be transferred in a more regular manner, say, every 3 months and the pit can be used to grow vegetables or bananas. When the pit is deep, it will take time to fill-up.



Photo 9: A farmer readying his pit for an arborloo. Please note the condition of his open pit latrine at the back.



Photo 10: An arborloo toilet in a mountain area, Manticao Municipality.



Photo 11: Top view of an arborloo toilet. This arborloo do not separate urine so an EcoPee or urine collector is placed at the side in order to conserve urine. The urine collector is appropriate for males. For females, what they do is to use a plastic urinal purchased from local stores or a recycled container is used as urinal in which the urine is then poured inside the EcoPee.

Note that in this particular arborloo, the cover-slab is made of cement. For me this is also a good choice, if not for its being heavy, because this will last long, say 10-20 years. The wooden walls and the roofing can be changed from time to time but the cover-slab and the cement bowl remains for a long time. The arborloo toilet bowl is covered to prevent flies and for aesthetic purposes.

Materials used for an arborloo toilet:

Cement	5 sacks	Steel Bars	10 pcs 8 mm
Tie Wire	1 kilos	Nails # ½	2 kilos
Nails # 4	2 kilos	Coco lumber	80 bd. ft.
Gmelina lumber	120 bd. ft.	Plywood	2 pieces
G.I. Sheets	1 piece	Sand and gravel	1 load
Nipa	200 pieces	Bamboo	5 poles
Arborloo Ecosan bowl	1 piece		

Some of the materials such as coconut lumber and gmelina wood can be replaced with whatever is available in the area. Nipa and plywood can be replaced with more cheap materials such as coconut palm and bamboo slats (amakan).

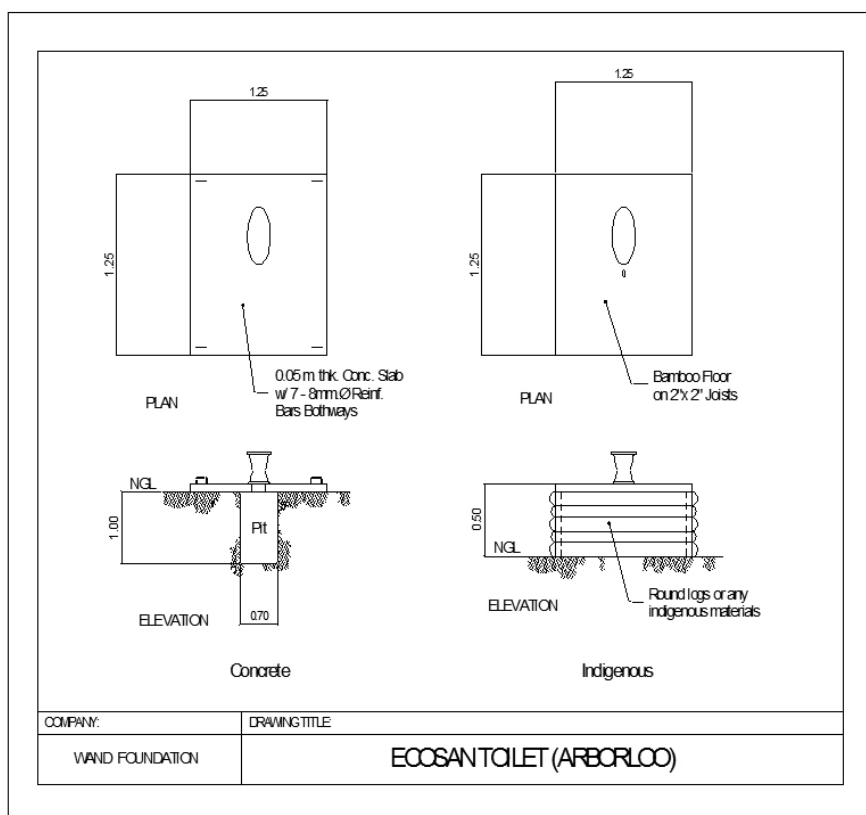


Figure 6. Schematic drawing of an arborloo ecosan toilet.

C. Single vault ecosan

Technical details:

- a. Floor area: 1.5 m x 1.5 m
- b. Floor Elevation: 2.5 feet
- c. Ventilation pipe: none
- d. Urinal pipe: diameter 1 inch
- e. 16 L plastic container and 200 L plastic drums for collection and storage of urine
- f. Roof: thatched roof (made of nipa leaves) or corrugated sheet roof
- g. The feces vault is made of steel drum cut in half or rattan basket.



Photo 12: Single-vault ecosan unit using low-cost materials. The frame is made of gmelina wood and coconut lumber, the floor of bamboo, the walls of recycled heavy-duty sacks, the roofing of thatched coconut palm.



Photo 13: Inside view of a single-vault ecosan toilet. The ash container (white plastic) is at the side while the green container is used for used tissue paper.



Photo 14: Single-vault ecosan toilets lined-up for transport. The beauty of this system is that this can be used as emergency toilets during situation of mass evacuation and calamities. The units can easily be dismantled and transported to the sites.

Materials for single-vault ecosan toilet:

Steel Bars	10 pcs 8 mm	Coco lumber	80 bd. ft.
Tie Wire	1 kilo	Nails # ½	2 kilos
Nails # 4	2 kilos	Gmelina lumber	120 bd. ft.
Plywood	2 pieces	G.I. Sheets	1 piece
Nipa	200 pieces	Bamboo	5 piece
200 liter drum	1 piece	Ecosan bowl	1 piece

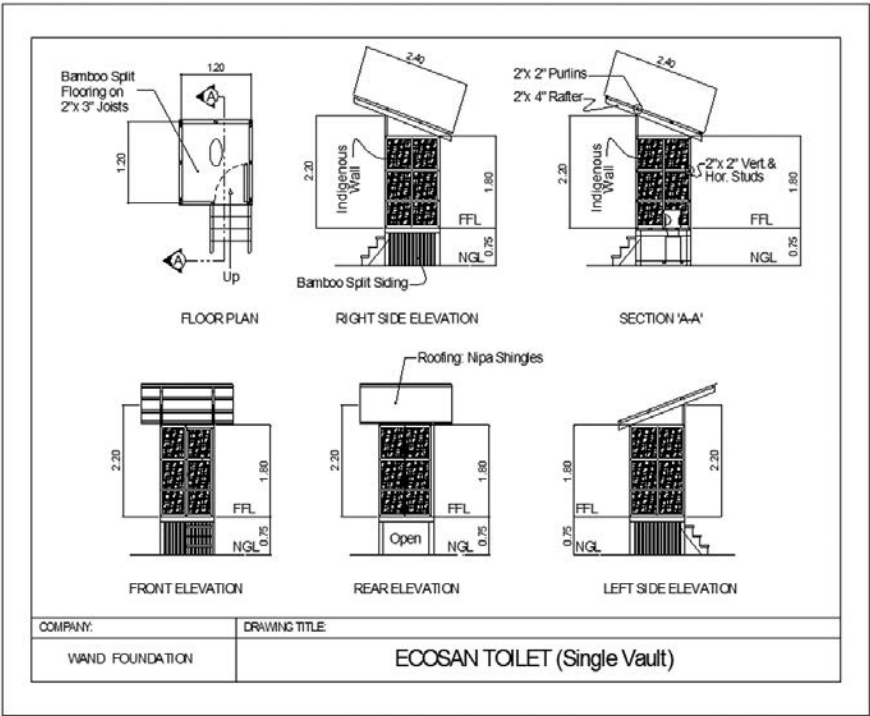


Figure 7. Schematic diagram of a single-vault ecosan toilet.

D. Ecosan for Poor Coastal Communities

Technical Details:

- a. Floor area: depends on the area where the ecosan toilet will be placed.
- b. Floor Elevation: depends on the area where the ecosan toilet will be placed.
- c. Ventilation pipe: none
- d. Urinal pipe: diameter 1 inch
- e. 16 L plastic container for storage of urine.
- f. Roof: nipa, galvanized iron or coconut palm.
- g. The feces vault is made of plastic tub or 200-liter drum cut in half lined with heavy duty recycled sack and garbage bag.

The coastal ecosan is geared towards promoting sustainable sanitation in depressed communities located in coastal areas with little or no sanitation being practiced primarily because of marginalization and the lack of space and resources. The focus will be on implementing a sustainable sanitation solution in coastal area in Mindanao and elsewhere in the Philippines by implementing a simple single-chamber urine diverting, dehydration toilets (UDDT) for fishermen along the seaside whose practice so far is to defecate directly into the sea. Adapted to the coastal conditions where most of the houses are built on stilts with little or no space available for conventional UDDT solutions is the low-cost hanging type solution.

Like in conventional UDDT systems urine and faeces is also collected separately. The faecal material is collected in a bucket lined with a plastic sack. As support service we provide for a regular twice a week collection of humanure from the coastal households and after respective secondary treatment (storage and vermi-composting) in the farm the material will be used to fertilize coconuts and fruit trees. Urine will be collected in 20 liter containers and will be used (after storage of 1 month) on small garden plots of the beneficiaries.

The rationale of this initiative is that most people living in the coastal zones in the Philippines are fishermen. With over-fishing and the problem of low fish catch, most of them are poor and marginalized. Making a toilet is farthest from their minds and they most often defecate in the coastal areas. This increases the problem of pathogenic contamination (e.coli, ascaris etc.) of the coastal areas and

the respective associated negative health impacts. Commonly favored solutions like flush toilets with septic tank as well as pit latrines cannot be implemented due to lack of space, the proximity to the sea and the sea level.

The coastal ecosan help solve this problem by containing the throwing of human waste to the sea like flying saucers and at the same time making use of these for agriculture purposes thereby closing the loop in food production and consumption. With the introduction of the hanging UDDT including an appropriate subordinated resource management in place it is expected that beneficiaries will enjoy a relatively flood resistant and safe sanitation system that allows them to urinate and defecate in dignity. Urine and feces are kept away safely without contaminating the immediate environment. This will result in an improved health situation for the involved communities and the reuse of urine and feces in agricultural production will provide low cost fertilizer and soil conditioner that will have a positive impact on their food situation.



Photo 15: Inside view of a coastal ecosan toilet. The toilet is built at a side of the house that is modified for the purpose.

Instead of direct defecation into the sea that results to pathogenic contamination of water bodies that has been practiced so far, urine and feces are safely stored and reused so as to avoid polluting the coastal areas and water bodies. In addition with the use of urine and feces in agricultural production the full fertilizer and soil conditioner potential of the resources is tapped so that eutrophication of coastal areas is reduced. Eutrophication is an increase in the concentration of nutrient content to an extent that increases the primary productivity of the water body. In other terms, it is the “bloom” or great increase of phytoplankton in a water body. Negative environmental effects include particularly anoxia, or loss of oxygen in the water with severe reductions in fish and other animal populations.



Photo 16: The house showing the view of the hanging ecosan toilet, Initao Municipality.

Materials for coastal ecosan toilet:

Tie Wire	1 kilo	Gmelina lumber	120 bd. ft.
Nails # ½, 4	2 kilos, 4 kilos	Coco lumber	80 bd. ft.
G.I. Sheet	1 piece	Nipa	200 pieces
Bamboo	5 piece	200 liter drum	1 piece
Ecosan bowl	1 piece		

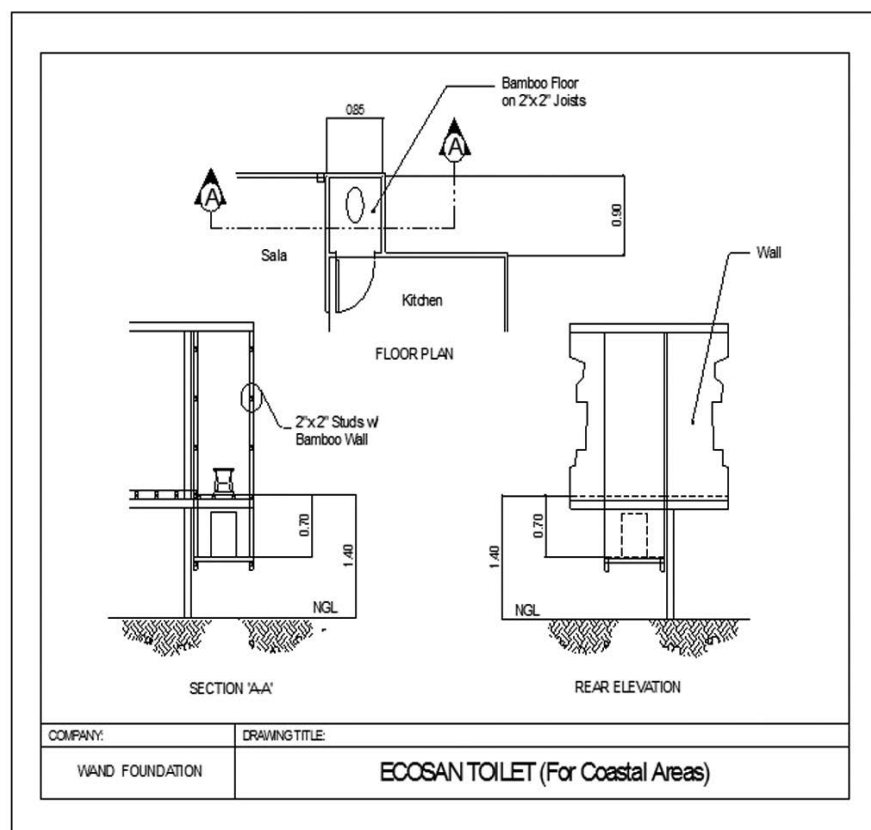


Figure 8. Schematic diagram of ecosan toilet for coastal areas.

The diagram shown in Fig. 8 is not standard in the sense that each housing unit in the coastal area is different and therefore the toilet should be built conforming to the situation of the housing unit as well as the final decision of the owner. For example in some coastal ecosan unit that we have already built was situated beside a room in the house and one was placed at the side of the kitchen. Still the feces and urine collectors were hanging and when the owner collects the urine and feces they do it by going down and opening the enclosed collecting area. Some owners prefer plastic tub for feces collector rather than the steel drum because the tub is lighter.

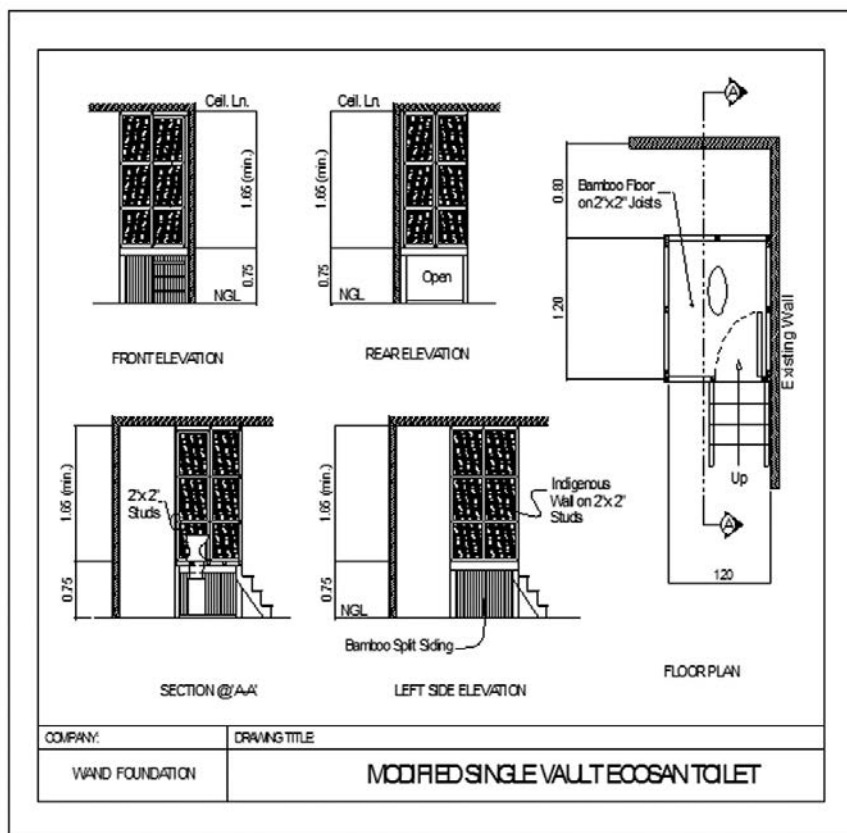


Figure 9. Schematic drawing of a modified single-vault toilet that is appropriate for coastal areas and areas with dense housing.

Figure 9 shows a modified single-vault toilet that is also appropriate for coastal areas and areas where houses are very close to each other. This type of toilet should be built conforming to the situation of the house and should consider such factors as location, ease in use, materials already in place, eg roofing, among others.

E. Ecosan for persons with disabilities and for toddlers



Photo 17: This is really a simple wooden chair designed and fitted with feces and urine collector. The person can just sit down and use it. After its use, the content is mixed with ash. The waste material is collected daily or placed in larger containers for storage.

This particular ecosan design is still in the design stage and the inspiration for this comes from a person walking at the roadside in Gimaylan bringing a stool with a hole in the middle. When I asked him for what it is for, he said that it is a stool where his bedridden father can defecate with relative ease. So I designed an “ecosan chair” that has the feature of a hole for defecating and another hole for urinating. This type of ecosan is also appropriate for toddlers especially during the evenings when they want to defecate and it is difficult to bring them to the toilet so they can just do it in the comfort of the room. The child’s “ecosan chair” should be smaller and custom-built for the size of a child. An NGO in Manila providing wheelchairs to disabled persons said that this could be an interesting addition to their repertoire of support.

Materials used are wood, glue, plastic container, nails, poly bag.

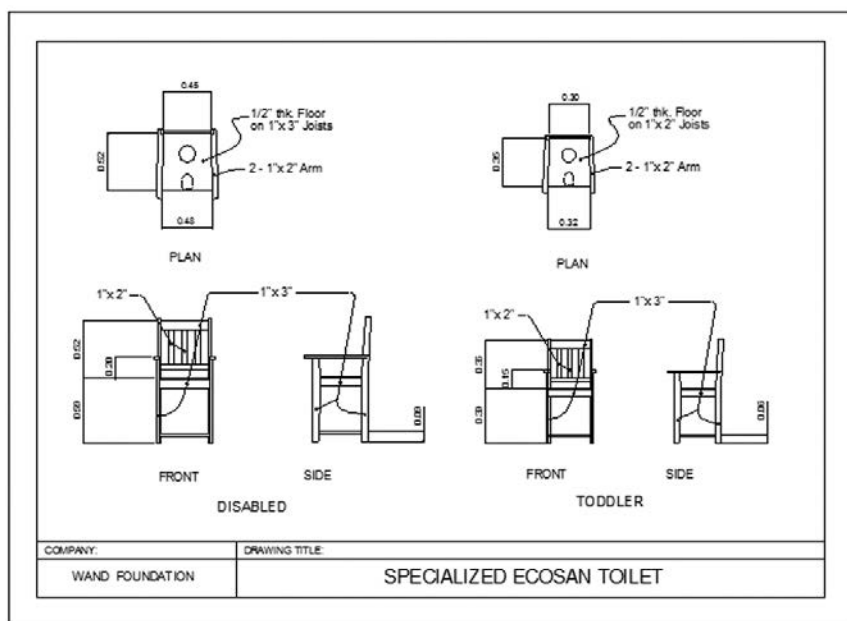


Figure 10. Schematic drawing of specialized ecosan for invalids and toddlers.

The power of this design is that in the case of disabled persons, i.e. bedridden, defecating is always a problem not only for the person but also for the helpers who have to bring the disabled person to the toilet. Letting him use a specialized simple toilet in the comfort of the room will remove the burden of letting the person defecate.

Another modification of this type will be integrating the UDD toilet system in the bed itself where the disabled person is placed. In this way defecating is comfortable and less of a hassle.

F. EcoPee

An EcoPee is simply a urinal appropriate for men and made of 18-liters recycled container and a 2-liter container fitted with a poly-pipe inverted and glued on top to form a funnel. Urinating will be done directly on the open portion of the small container. In our experience, when the container is half-full with urine, we transfer the urine to a large container that is tightly closed to prevent odor. The odor is the ammonia escaping to the atmosphere. Some of our EcoPee users just empty the urine at the sides of the flowers or bananas, taking care that the leaves should not come in contact with the urine otherwise it will be scalded. The technique is to cultivate the sides of the plants and then pour the urine into the cultivated portion and cover it with the disturbed soil. Our work in EcoPee is further popularized with a grant from the Japan Fund for Water provided to the ALEY-NM in 2009.



Photo 18: The Association of Locally-Empowered Youth in Northern Mindanao (ALEY-NM), a group of youth championing the use of EcoPee in Misamis Oriental.

At 60-75 pesos per EcoPee, it is one of the most practical and cheapest modes of urine conservation. In schools with pour-flush toilets, we introduced EcoPee and place it in the toilets so that when a child pees he or she uses the EcoPee instead of the pour-flush toilet. In this manner, urine as well as water that are flushed is conserved.

Chapter 3:

Ecosan Allied Initiatives

a. Rain and Grey-water Conservation



Photo 19: Recycled drums are used for urine, rainwater and grey-water collection. Recycled drums can be plastic or steel. In our case we are using steel which is cheaper than plastic although the advantage of the plastic is that it does not rust.

We provide recycled 200-liter drums from a junkshop in Cagayan de Oro as a tool where the locals can conserve water every time there is rain. We provided this not as dole-outs but as soft loans and those wanting to have drums apply and pay some deposit fee before the drums are delivered to them at batches of 50 per delivery with a household getting up to a maximum of 2 drums. This component is a big hit and demand exceeds what we can supply. This is so because we purchase the drums at cheaper wholesale price direct from a big junkshop so we are able to sell it at a much lesser cost.

b. Vermi-composting

Secondary treatment via vermi-composting is a necessary component of an eco-sanitation initiative because the feces harvested from the ecosan vaults needs to be treated for at least another 6-8 months to completely destroy the ascaris eggs.



Photo 20: Construction of the vermi-compost need not be expensive and consist of local materials such as bamboo, sacks, wooden poles and coconut lumber.

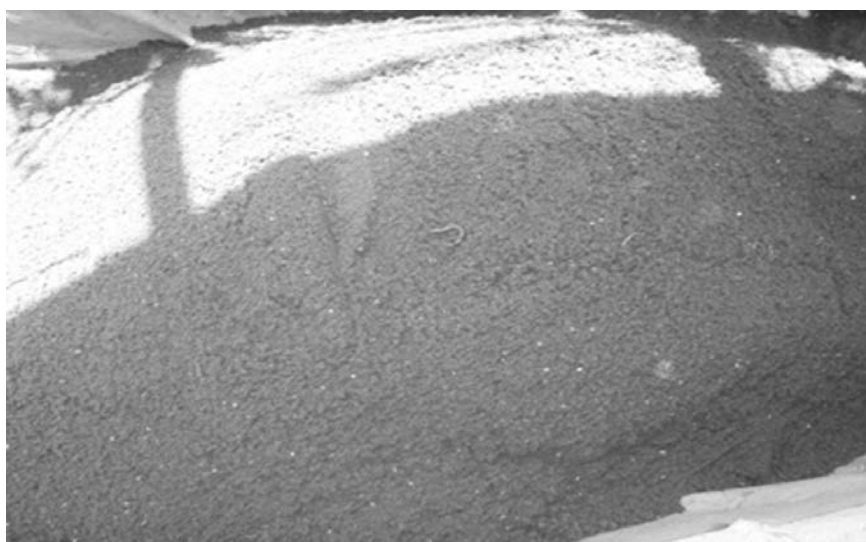


Photo 21: Fine, high grade organic fertilizer from the vermi-compost.

c. Tree Planting using Ecosan Products

Importance of trees

- Absorbs waste like Carbon Dioxide (CO₂)
- Provides oxygen
- Use energy from the sun
- Habitat for birds and insects
- Absorbs noise
- Provides water
- Gives medicine
- Provides lumber, gum, latex, tannin.
- Medicine
- Prevents soil erosion
- Absorbs water from rain
- Filter water
- Stores water
- Prevent soil erosion
- Supports the growth of micro-organisms

The variety and health of our upland resource is an important element in the survival of our planet. Forests are living entities and home of so many organisms. It protects our farms and water resources and is important for our leisure activities. Trees store carbon and prevent “greenhouse effect”. Forests contribute much to our economy. Our trees are dwindling at a very rapid rate and thus the need to study and learn about it. We also need to learn the methods in producing, using and replacing small woodlots on a sustainable basis. We have to learn how our forefathers use their forest resources in a sustainable manner. The benefits that we can derive from our forest resources are multiple and includes the following; economic, soil erosion control, habitat for animals, for our leisure, among others. Our main goal is to use our forests in a sustainable manner not only for us but also for our children.

Nutrient recycling

One of the most important roles of our forests is to transform the energy from the sun into food through photosynthesis. This is a process of combining hydrogen from water and carbon from the atmosphere. The result is the production of simple sugars that becomes food for green plants. All organisms including human beings are dependent upon green plants. If there are no green plants then we will all die.

Other than simple sugars, plants need other elements in order to survive. There are seventeen elements that are needed in order for a plant to grow. Some of these like the element potassium are present in stones and nitrogen is present in the atmosphere.

The recycling of nutrients in forests is an important process needed for the health and integrity of the forest. The recycling of nutrients occurs in all ecosystems.

If one walks in the forest floor, one is walking in so much organic materials like leaves, branches, fallen trunks, mushrooms, fungi, dead animals, among others. Because of this, the nutrients needed by the forest are present in the thin layer within the forest floor. The system of recycling of nutrients in forest is very much developed but once a forest is denuded, the top soil and the organic materials located therein are also lost resulting to unproductive uplands. Loss of animals results as their habitats are destroyed.



Photo 22: A seedling nursery need not be expensive. Local materials as well as local seeds can be used in starting a seedling nursery.

Some useful tips in tree planting:

- a. Select good, robust seedlings. This is the problem in most tree planting activities because tree planters just get the seedlings wherever they are and not considering the quality of the seedlings. Good, robust seedlings will eventually mean healthy plants that can withstand stress as it grows.
- b. Plant in rainy season. Seedlings fresh from the nursery will easily die or stressed during the planting transfer process. In our experience we see to it that there is rain for a few days or so before we do the tree planting activity. In this way survival rate of the plants is high.
- c. Dig a hole at least 1 foot x 1 foot or bigger and place organic matter such as ecosan products to the newly planted trees. The technique which we used in the use of ecosan product is to place it in an old sock or any biodegradable material and place it in the hole then covered it with soil. Then the seedling is placed on top. Even ecosan products that have not passed through secondary treatment can be used this way but taking care that the farmer has adequate protection such as mask and hand gloves.
- d. Young seedlings are better than old ones. Old seedlings should be discarded and not planted anymore. Young seedlings are more vigorous and can withstand stress in nature.
- e. In areas where there are animals, put tree guards in the newly planted seedlings. Tree guards can be simple coconut palms or bamboos or any other material abounding in the area.
- f. Cut grasses (ring weed) around the newly planted seedlings at least once every 3 months or when grasses are already growing. It is not practical to do clean-cutting and ring weeding will be the better option.
- g. Urine can be used every now and then in order to fertilize the plants. The sides of the soil where the seedlings are planted are cultivated then urine is poured into it then covered with soil.
- h. Finally, it is advisable that different species of trees are planted in an area to prevent disease infestation. We observed that tree mono-crops are very susceptible to disease infestation.

d. Gardening using ecosan products

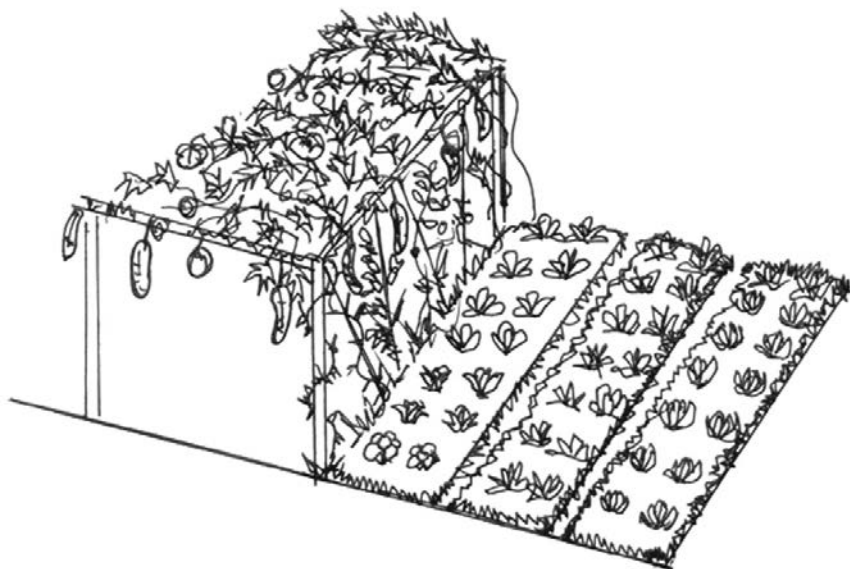


Figure 11: View of a mixed garden.

Vegetable gardening need not be a complicated exercise but it can be done even with very small spaces and using recycled materials such as plastic containers, sacks and unused bags. Organic matter in the house such as kitchen waste, urine and animal manure can be used as fertilizer.

The importance of vegetable gardening

- ✓ Vegetables are needed by the body. Vegetables are full of vitamins and minerals.
- ✓ Many Filipinos are deficient in vegetable consumption even if vegetables are easy to grow. The average consumption of Filipinos of green leafy vegetables is 12.4 kilos while our body needs 32.4 kilos (Food Nutrition and Research Institute data).

- ✓ The main reason why Filipinos do not eat vegetables is their ignorance about the importance of vegetables in our nutrition and diet.
- ✓ Raising vegetables means less expense and more savings for the family.
- ✓ Vegetable gardening unites the family as the members of the family raise vegetables together.
- ✓ Vegetables grown around the house are much more safer than the vegetables one buys in the market.
- ✓ Vegetable gardening will help you physically and it is one form of good exercise.

Some gardening tips

- ✓ Select an appropriate place
- ✓ Good water source
- ✓ Good drainage
- ✓ Fertile soil
- ✓ Should be located direct to the sun
- ✓ Soil should be well-prepared
- ✓ Good drainage
- ✓ Fertile, loose and friable
- ✓ Use of ecosan products
- ✓ Vermi-compost as soil amendment and fertilizer.
- ✓ Use of urine as fertilizer. Urine should be plowed into the soil around the plants and not watered directly to the leaves to prevent scalding.
- ✓ Utilize all available spaces, vertical or horizontal

Basket composting – use of bamboo and other materials in order to form a basket where the organic materials are placed and the vegetables grown.

Plant a variety of vegetables to utilize all available spaces.



Photo 23: Fertilizing the plant with urine. Pour an appropriate amount of urine at the side of the plant and not at the leaves then plow back the soil in order to cover the urine.



Photo 24: Variety of vegetables taken from the home-garden. This is more than enough for the nutrition needs of an individual.

Chapter 4:

Local Stories

Over the course of our ecosan implementation we craft success stories in order to serve as guidance for others as well as to document our progress in the field. Below are 5 such stories with most being published in the Water and Solid Waste newsletter.

Success Story 1: Association of Locally Empowered Youth in Northern Mindanao (ALEY-NM) Eco-Pee, Rain and Grey-water Conservation and Vegetable Gardening Initiative

The ALEY-NM started as a loose group of like-minded youths concerned about the deteriorating environment, poverty and the lack of opportunities in the rural areas especially in the uplands where soil erosion, low soil fertility, lack of water and erratic climatic conditions makes life very difficult. Several ALEY-NM heroes started the initiative and to mention a few; Tine Mayeur, an indefatigable Belgian volunteer who lived and worked in the barrios in Libertad, Initao and Manticao in Misamis Oriental for 6 months in 2007; a group of students from the Mindanao State University doing their on-the-job-training; and, ordinary folks who try to seek solutions to the problems of resource degradation, poverty and the lack of opportunities for the youth in the rural areas.

In early 2008, a core group of youth leaders decided to formalize an organization and register it with the Securities and Exchange Commission (SEC, registration pending). In 2008, the ALEY-NM made its first breakthrough when it became a finalist in a British Council-sponsored national competition entitled “I am a Change Maker” with the project on local biodiversity conservation and management. This energized the association with the idea that, yes, indeed the youth can be catalysts for change!

Our vision is “To be a model youth organization in Mindanao, willing and able to advance the cause of progress, sustainable development and promote the culture of peace.”

In June 2009, the ALEY-NM launched its newest project which is “Eco-Pee, Rain and Grey-water Conservation and Vegetable Gardening Initiative”. The concept is simple. It includes the collection of urine and using it as fertilizer, the promotion of vegetable gardening among youth and their families and the conservation of rain and grey water to be used in the vegetable gardens. The project gets its cue

from cases around the world on the usefulness of urine as fertilizer and the fact that commercial fertilizer nowadays is very expensive with urea (45-0-0) at more than 2,000 pesos per sack. The WAND Foundation provides guidance and advice as well as small fund support for the implementation of the project. Technical advice is also provided by Robert Gensch, ecosan expert based in Xavier University. The sustainable sanitation website (www.susana.org) is one of our useful references.

At present we have distributed 120 Eco-Pees' to 3 elementary schools and local farmers and 75 rainwater collectors mainly to local farmers. The local farmers are youths who have stopped schooling and engaging in farming activities. Our target for this year is to distribute a total of 1,000 Eco-Pees' and 500 rainwater collectors and to enlist 300 youth-farmers to engage in vegetable gardening. With the upcoming local elections, we will try to engage political wannabes to support us, and with their pictures pasted in our Eco-Pees'. Our Eco-Pees' are made from 20 liter-recycled containers with an inverted 2-liter container glued at to top. The rainwater collectors are recycled 200-liter drums. One Eco-Pee costs 65 pesos while a rainwater collector costs 390 pesos. We plan to scrounge local households and commercial centers in Cagayan de Oro and Iligan City and ask donation of empty containers and drums for this project so that our cost can be reduced further.

Our plan by October 2009 is to start selling urine as liquid fertilizer, following the experience of Linus Dagerskog (linusdagerskog@yahoo.fr) in Burkina Faso, albeit ours will be on a limited scale. Our main target market will be small-scale vegetable and flower garden enthusiasts. We will do this by installing Eco-Pees' in public places such as chapels, markets and barrio centers and collecting the urine then placing it in recycled mineral water plastic bottles and labeling and selling it. The income will be used to fund our operation and to send some of our members to school. Our preliminary analysis shows that we will get 200 percent return of investment (ROI) with this project.

Contributed by: Jed Christian Sayre, Executive Director, Association of Locally-Empowered Youth in Northern Mindanao (ALEY-NM). Lubluban, Libertad, Misamis Oriental, 9021. Email: nm_aley@yahoo.com

Success Story no. 2. Providing Ecosan Solution to a Youth Camp.

Last April 9-11, the Catholic Charismatic Renewal Movement in the province of Misamis Oriental held a summer youth camp at the St. Anthony de Padua Parish grounds in Manticao Municipality. There were more than 1,000 attendees coming from different parishes in Misamis Oriental. Two weeks before the event the organizers came to the WAND Foundation to ask assistance in providing sanitation solution to the activity. They said that the few water-sealed toilets in the parish could not accommodate the needs of the participants. We readily responded by saying, “yes, we can indeed provide pre-fabricated single-vault urine diverting dehydration (udd) toilets for your needs”. We have not done this before hence there is the challenge and the opportunity to record in real time actual pre-fabrication, installation and dismantling of robust single-vault toilets units in a summer camp setting. If we are successful in this then we can also use the experience to rapidly deploy sanitation solution in cases of emergency, say, when there is an earthquake or flash-flood or mass evacuation of people.



Photo 25: Loading the pre-fabricated udd toilets.

One week prior to the event, 2 of our carpenters prepared the single-vault udd units. The main materials used were wood, bamboo, plastic sheeting, rattan basket lined with heavy-duty sack and garbage bag for the feces collector and 18-liter containers for the urine collector. The plastic sheets which were used for the walls and roof, sacks for the feces collection and containers were recycled materials we purchased from a junk store in Cagayan de Oro City while the bamboo, wood and rattan basket came from Libertad and adjacent Initao. Within the weeklong period our 2 carpenters were able to pre-fabricate 5 single-vault udd units, completing 1 unit per day. On April 8, we delivered the udd toilets to the camp grounds. Four of the units can be fitted in the elf vehicle while the ash, containers and other materials we loaded in a smaller kia vehicle. Manticao Municipality is about 12 kilometers away from Libertad where the pre-fabrication were done.

Installation of all the 5 units took about 4 hours and by early evening of April 8, all of the udd toilets were ready for use. To educate the participants on its proper use we requested the organizers to conduct an orientation on the proper use of the toilets. We also placed easy to read guidelines on its use inside each toilet. The guideline in Cebuano (with English translation) enumerated thus;

1. Kanunay gyud nga siradoan ang toilet bowl aron walay makasulod nga langaw. (Always close the toilet bowl so that flies could not enter).
2. Human sa pag-gamit niini, bubu-an kini ug abo dayon isirado. (Pour ash after use then close the toilet bowl).
3. Dili gyud bubu-an ug tubig ang toilet bowl. Ang ilo (tissue paper) puede ra ihulog sa toilet bowl. (Never use water in the toilet bowl. Tissue paper can be dropped into the toilet bowl).
4. Malibang lamang sa libanganan nga bangag ug mangihi sa may ihi-anan. Dili gyud malibang sa portion nga ihi-anan. (Defecate only on the portion for the feces and urinate in the portion for the urine).
5. Ang pag-limpiyo sa toilet bowl mao ang pag-gamit sa omog nga trapo nga ihumol sa tubig nga may disinfectant. Siguradoha gyud nga walay tubig makasulod sa toilet bowl. (Use cloth soaked in disinfectant in cleaning the toilet bowl. Be sure no water enters the toilet bowl).

In order to make sure that the users follow the guide, we placed one person to clean, replace the ash, collect the feces and urine and replace the garbage bags and generally to oversee and manage the use of the udd toilets. Aside from the udd we placed also several EcoPee male urinals near the udd toilets assigned for males.



Photo 26: Installing the pre-fabricated units. Rattan basket is used for feces collection. Eco-Pees or male urinals lined at the side of the concrete fence.

On overall, the udd toilets were used smoothly and without any major problems. The orientation prior to use was effective and assigning one person to guide the users helped a lot. Our direct benefit is that we were able to collect urine and feces to be recycled as fertilizer aside from helping provide sanitation solution to a youth camp. The indirect benefit is to be able to pilot the rapid deployment of an ecosan solution in a setting where mass of people converge. We can extrapolate that in situation of emergency, the same procedure and logistics can easily be used.

Success Story no. 3. Case Study on successfully implementing an ecosan project funded by the Japan Water Forum (JWF) Fund.

The Association of Locally Empowered Youth in Northern Mindanao (ALEY-NM) successfully implemented a project aimed at conserving water, promoting ecological sanitation and improving food security by vegetable gardening and tree planting. The JWF (www.waterforum.jp/eng) is a “nonprofit organization... set-up through cooperation of all stakeholders... for the purpose of solving water problems in the world.” On July 1-31 the JWF received 220 applications from 21 countries and 14 of these were selected for funding. One of those selected was the project proposed by the ALEY-NM. The project started in October 2009 and was completed in February 2010. The rationale of the project is that there is a lack of water in upland, marginal areas, with local farmers getting water from far-off springs and creeks with so much effort, time and labor to get it. Women who often are the ones delegated to fetch water are the most disadvantaged. In this situation health and sanitation suffer because our traditional flush toilets would not be effective anymore and people remove their bowels and urinate in the bush or open areas.

Our solution for this water issues is to implement arborloo ecological sanitation toilets, eco-lilies and grey water/rainwater conservation using recycled containers. The arborloo are modified pit latrines wherein the cover-slab, toilet bowl and superstructure are movable when the pit is filled with human waste then it is planted with trees, vegetables and or bananas. The resulting growth will be luxuriant because the plants will benefit from the fertilizer stored therein. Eco-lilies are modified containers with a funnel for people to urinate and the urine collected to be used as fertilizer for the plants. Grey water and rainwater is conserved using recycled containers.

The activities of the project funded under the JWF involves the following; a. conduct of strategy sessions among the officers of the ALEY-NM on the first week of October 2009. The strategy sessions took place in the office of the association in Libertad and were participated in by most of the key officers of the association. After the preliminary meetings the decision was to implement the project in barrio Gimaylan and Lubluban in Libertad because it is near the office and because there are about 40% of local people here who openly defecate because of lack of toilet facilities. In middle of October to first week of November identification of 10 families who will establish the arborloo toilets and 100 youths who will participate in the vegetable gardening activities and who are willing to use urine collected from the eco-lilies as fertilizer were identified. Then purchase of vegetable seeds and used 20-liter containers as well as pre-fabricating the arborloo toilets using recycled materials and wood cut from local sources started. For the vegetable seeds bulk purchase was done at the Mt. Carmel Rural Life Center in Davao and the seeds were repackaged in small packets.

The 10 arborloo units were established on December 2009. During this time 180

eco-lilies and 100 packets of vegetable seeds were purchased and distributed. As a side event, we were able to send 2 pictures of our activities to a national competition in Manila and we became one of the finalists. We reached a total of 10 families for the arborloo toilets with an aggregate number of individuals totaling 47. For the eco-lily users and vegetable gardeners, we reached a total of 120 beneficiaries. Aside from the direct beneficiaries we were able to train and educate on the topics about gardening and using of urine 75 more local youth who showed interest to join our activities.

The methodology we used in implementing the activities of our project is basically straightforward community facilitation and explaining to the local people the value of re-using human waste as fertilizer and in practicing vegetable gardening as a source of local nutrients rather than buying vegetables in the market whose source we don't know and may be pesticide-laced. We also explained to them that open defecation results in the spread of worms and communicable diseases/diarrhea and we said that one feces in the open can infect 10-20 children. The construction of the arborloo units is fairly simple and we used local materials such as sacks, nipa shingles, coconut fronds and round woods. The recycled plastic containers for the urine collectors were purchased in Cagayan de Oro. We promoted vegetable gardening in small spaces around the home and not the large-scale type of garden. In this way, it is easy for the raisers to take care and the family can just get the vegetable they need daily.



Photo 27: A beneficiary helping construct his arborloo ecosan toilet.

The following were the outcomes of the project;

1. Open defecation is prevented by 47 individuals with the implementation of 10 arborloo toilets. This means that infection due to open defecation is prevented in these 47 individuals and their neighbors who may step on feces on the ground (when they have no toilets before). Theoretically, if they have used flush toilets, the savings in water used is tremendous.
2. Fertilizer saved from urine is about 1 liter per day or 120 liters for all beneficiaries. Peso value for this (urea value) means a saving of 60 pesos per day for all the beneficiaries or 1,800 pesos per month.
3. The 120 home-gardens average an area of 12 square meters and are producing an average of 300 grams of green, leafy and yellow vegetables a day. This is enough nutrition for the whole family. The peso value saved per family is computed at 12 pesos per day x 120 families = 1,440 pesos per day.
4. Improved understanding of ecological sanitation in our project areas. Whereas before human feces is treated with derision and there is a yucky feeling but now it is considered an important resource that can be used in order to grow food and plant trees. The project is able to educate a total of 242 individuals.

The conclusion that we can draw from the project is that it provided benefits in terms of preventing communicable diseases, improving health and nutrition and educating the public especially poor, marginal beneficiaries that ecological sanitation really works and that it is possible to close the loop between food production and consumption by re-using human waste. Our future activities will be to present our gains in publications, workshops and symposia as well as to encourage local champions to support us in scaling-up our activities.

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Success Story no. 4. Implementation of coastal ecosan toilets in Libertad and Initao Municipalities, Misamis Oriental.

With funding from the Sustainable Sanitation and Water Resources Management in Asia and in partnership with Xavier University we successfully implemented ecosan toilets appropriate for coastal communities. This is one of our latest

breakthroughs in bringing ecological sanitation to the poor. The initiative is geared towards promoting sustainable sanitation in depressed communities located in coastal areas with little or no sanitation being practiced primarily because of poverty and the lack of space and resources. The focus is on implementing a sustainable sanitation solution by piloting simple single-chamber urine diverting, dehydration toilets (UDDT) for fishermen along the seaside whose practice so far is to defecate directly into the sea.

Adapted to the coastal conditions where most of the houses are built on stilts or are spaced very close to each other, with little or no space available for conventional UDDT, the classical double-vault UDDT design is changed into a low-cost hanging type solution as well as single-vault systems. Like in conventional UDDT systems, urine and feces are collected separately with the fecal material collected in a bucket lined with heavy-duty recycled sack and garbage bag. The materials used for roofing are woven coconut palm fronds, the walls are either bamboo or heavy-duty sacks and the flooring is bamboo reinforced with coconut lumber. The cost of one coastal ecosan toilet ranges from 900 to 1,200 pesos.

As support service the WAND Foundation is providing regular collection of humanure and after respective secondary treatment (storage and vermi-composting) at the WAND foundation 6-hectare demo farm in Libertad, the materials are used to fertilize coconuts, bananas and fruit trees. Urine is collected in 20-liter containers and is used after storage of 1 month on small garden plots of the beneficiaries with the excess collected by WAND Foundation. Vegetable seed packets for the gardens are provided by the WAND Foundation. A total of 70 families benefits from the initiative. In addition to the implementation of the coastal UDD toilets a sanitation and hygiene information campaign was done.

All of the participating families became automatic members of the Ecosan Club – Philippines which is a new association registered with the Securities and Exchange Commission (SEC) and whose activities are focused solely on promoting ecological sanitation at the grassroots level. This is so because the thematic area covered by the WAND Foundation such as agro-forestry, micro-finance, land redemption aside from ecological sanitation is broad and there is a need to create an association dedicated solely in promoting ecological sanitation. The participating families assist in promoting ecosan and explaining how their UDDT's works to visitors. Being considered a "first" in Misamis Oriental, it is expected that visitors would be interested to see how this particular initiative works.

The impact of this project to the beneficiaries is that most people living in the coastal zones of Misamis Oriental province and in most coastal zones in the Philippines for that matter are fishermen and with over-fishing and the problem of low fish catch, most of them are poor and marginalized. Making a toilet is not a priority and they most often defecate in the coastal areas. This increases the

problem of pathogenic contamination (e.coli, ascaris etc.) of the coastal areas and the respective associated negative health impacts. Commonly favored solutions like flush toilets with septic tank as well as pit latrines cannot be implemented due to lack of space, the proximity to the sea and the sea level.

This project help solve this problem by containing the throwing of human waste to the sea and at the same time making use of humanure for agriculture purposes thereby closing the loop between food production and consumption. With the introduction of the coastal UDDT including an appropriate subordinated resource management in place, the beneficiaries are now enjoying a relatively flood resistant and safe sanitation system that allows them to urinate and defecate in dignity. Urine and feces are kept away safely without contaminating the immediate environment. This results in an improved health situation for the involved communities and the reuse of urine and feces in agricultural production provide low cost fertilizer and soil conditioner that have a positive impact on their food security situation. The ecosan system for coastal communities is also very applicable in urban slums and in areas where houses are close to each other.



Photo 28: The author supervising the construction of a hanging ecosan toilet.

Success Story no. 5: Promoting Ecological Sanitation via the Philippines 21 Young Leaders Initiative

Young leaders from business, civil society and government are among the change-makers selected for the Philippines 21 Class of 2010. A flagship program of Asia Society-Philippines, the Philippines 21 Young Leaders Initiative aims to develop a nationwide, multi-sector network of change-makers to meet, educate and inspire each other as well as collaborate and share ideas on public service and other meaningful initiatives, and build relationships of trust and understanding. There are 10 Fellows selected for this batch and I am one of them and my flagship program is ecological sanitation with my vision of “improved environment via people’s initiative such as tree planting and solid-waste management with people cooperating and helping each other for the common welfare”.



Photo 29: Meeting with youth leaders to plan ecosan implementation.

My aim is to scale-up efforts on ecological sanitation and address the problem of lack of sanitation facilities (eg. toilets) in the rural and urban areas due to poverty, water scarcity and lack of proper technologies by the introduction of urine diverting, dehydration toilets and the re-use of human waste for small-scale agriculture and peri-urban gardening in order to enhance food security and lessen the dependence in using chemical fertilizers and at the same time control the spread of diseases as a result of open defecation. Aside from heading the ALEY-NM, I am also a newly elected municipal councilor at 22 years old and the Young Leaders Initiative will enable me to showcase ecological sanitation with fellow young leaders as well as mentors and share my experience during the annual Asia 21 Young Leaders Summit to be held in Jakarta, Indonesia this coming December 2010.

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Chapter 5:

Conclusions and Recommendations

Major Lessons in Ecosan Implementation:

Our lessons in implementing ecological sanitation include the following:

- a. Some people did not participate. They distrusted or even opposed the ecosan project because it aimed at changing existing sanitation norms and practices such as open defecation. For some, open defecation is easy and hassle-free. There is no need to follow steps and guidelines.
- b. It became clear that social acceptance cannot be reached by a one-time activity, since it may be very difficult to change long-held religious beliefs and cultural practices. One belief is that feces are associated with dirt and are “yucky” therefore it is not appropriate to use them as fertilizer. It is important to involve the community from the planning phase to the implementation and to provide a proactive, consistent, clear and reliable communication with all concerned stakeholders in order to gain trust.
- c. The lack of political will among the local government units for providing improved sanitation constituted a major obstacle. Improved sanitation is farthest from the minds of most local officials.

Some of the factors the project succeeded in are described below:

- a. Identification and mobilization of local promoters: An evaluation carried out by the municipality found that approx. 70% of the people were neutral to the ecosan approach. Another 15% of early adopters actively supported the idea while the remaining 15% vehemently opposed it. For an effective promotion, the 15% of early adopters were encouraged with the aim to have them persuade the 70% of neutralists. This was done by concentrating on innovative local farmers who had leadership capacity and stamina to promote ecosan to their neighbors.
- b. Implementation of incentives: As an incentive, farmer participants were provided with vegetable seeds on a credit basis.
- c. Use of multiple teaching and learning techniques: Some of the early ecosan initiatives lacked continuous training (one example is the experiment done in Bohol Province by a group based in Thailand). In the present case, multiple teaching methods like lectures, posters and simple illustrated manuals in the local dialect as well as onsite demonstrations were used. The GTZ Philippines trained 3 of our field officers on ecosan in Dumaguete City in 2007. This has ensured that the ecosan concept slowly became part of the people's routine actions.
- d. In order to be credible, own practice should precede any promotion. In this spirit, an ecosan UDD toilet was built in the WAND main office in Libertad which is used by WAND staff and by farmers coming to the office to attend training sessions.

Conclusion and Recommendations

- a. In terms of policy, for the government to come up with a pronouncement that will institutionalize ecological sanitation in schools and in public places. Coupled with this pronouncement will be a support fund that will be used in order to construct ecosan toilets in these schools and public places such as in barrio halls, waiting areas and public clinics. In our experience one double door ecosan toilet will cost approx 28,000 pesos to construct and this can serve a total of 300-500 households, a small investment compared to the benefits in terms of low disease and parasite infestation, less pollution and contamination of the water tables, etc.
- b. For the department of education to institutionalize ecosan teaching in the schools. The schools can well serve as the local promoter of ecological sanitation plus the help of local NGOs such as the Local Empowerment Foundation and the policy-level assistance of the local government units. These multi-level collaboration and coordination will be an effective tool to popularize and promote ecosan in the local areas.
- c. Our present practice is to promote ecosan at the commune level since cost of constructing one is too high for a household to consider. One direction should be for ecosan to be adopted at the household or family level with NGO and local government support and incentive.
- d. In the arena of research, more research should be done in the area of actual cost-benefit measurements using multi-criteria analysis to determine the actual benefit (and cost) in using ecosan toilets versus in just defecating and relieving under the hot sun. The research output can be used to educate and inform local stakeholders about the value of ecosan. Another research theme will be on the cultural and socio-economic aspects taking into consideration affordability, sustainability and conformity to religious and cultural practices, among other aspects.
- e. In the arena of advocacy, there should be a network or even just a blogspot solely promoting and “marketing” ecosan to the public. This site should enable practitioners, policy makers, extension workers and advocates to exchange notes, get moral support and even find some funding possibilities.
- f. Since eco-sanitation is an infant approach/concept in the Philippines (started only in 2005 with a GTZ-supported project in the Visayas), effort should be made to document best practices so that this can be popularized and or made into a resource book.
- g. In terms of cost-recovery, an “ecosan user fee” can be implemented with those using the toilets paying a small fee to recover cost of construction and maintenance of the toilets. User fees in public toilets here are fairly common. Some of the organic fertilizer and compost can also be sold to seedling nurseries, flower enthusiasts and gardeners in order to recover cost.

Annexes

Annex 1. Definition of terms –

Arborloo – literally “tree toilet”, the arborloo is an improvement of the pit latrine with ash or soil placed on the pit. After the pit is filled, the cover-slab and the super-structure is transferred to a new area and the filled pit planted with fruit trees or other plants such as bananas.

Double-vault ecosan - UDD toilet with double feces vault. The toilet bowl is transferred to another vault when the original vault is already filled.

EcoPee – 18-liter container fitted with urine funnel used to collect urine from male users.

Ecosan – short for ecological sanitation, is a movement and a technology geared towards the collection and re-use of human urine and feces and re-using it for agricultural purposes, mainly as fertilizer for the plants.

Grey-water - Grey-water is wastewater generated from domestic activities such as laundry, dishwashing, and bathing which can be recycled on-site. Grey-water differs from water from the toilets which is designated sewage or black-water to indicate it contains human waste.

Hanging ecosan – term used for UDD toilets placed in coastal communities or places where houses are very near each other (eg. slums). Feces and urine are regularly collected and transferred to a storage area.

Single-vault ecosan – a variation of the double-vault with only 1 feces storage usually made of rattan basket or recycled steel drums cut in half.

Urine diverting, dehydration toilet (UDDT) – refers to dry toilets which dehydrate human feces by placement of ash and diverting urine to a container for re-use as plant fertilizer. Sometimes the term “UDDT” is interchanged with “ecosan.”

Annex 2: Ecosan Club Philippines

Ecosan Club - Philippines is a non-profit membership organization composed of communities of Ecosan users and practitioners, champions and supporters. The Association was established on July 20, 2010 under SEC Registration No. CN201030103 with the purpose of promoting ecological sanitation and allied activities.

Vision: Improving health, sanitation and overall quality of life of the base of the pyramid through ecological sanitation.

Mission: To rapidly build the capacity of LGUs, communities, and private sector to promote ecological sanitation as a sanitation option through research, trainings, technical assistance, information exchanges, and network building.

Objectives:

1. To actively promote ecological sanitation as one of the sanitation solutions for the base of the pyramid.
2. To provide education, training and other services related to ecological

sanitation, sustainable small farm development and agro-forestry.

3. To create Ecosan Clubs that will promote and champion ecological sanitation and related initiatives in rural and urban areas.
4. To partner with stakeholders with the goal of improving the overall quality of life of the base of the pyramid through ecological sanitation.

Services:

Capacity-building: Ecosan Club - Philippines designs and implements customized Ecological Sanitation-related trainings, facilitate study tours and conducts occasional conferences and seminars.

Information Services: Ecosan Club - Philippines produces ecosan, small farm development and agro-forestry training and instruction manuals.

Marketing and scaling-up: Ecosan Club - Philippines markets low-cost ecosan toilet bowls, starter pre-fabricated ecosan units for demonstration and pilot purposes, toilet bowl molds and other ecosan-related products such as vermi-compost and seedlings.

For inquiries and information about membership please contact: Ecosan Club-Philippines c/o WAND Foundation, Libertad, Misamis Oriental, 9021 Philippines.
Email address: empower_8@yahoo.com

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Sayre, E. V. and Sayre, C. (2007) Promoting the Rehovot Approach in Advancing Integrated Rural Development and Peace in Conflict Areas in Mindanao, the Philippines. First prize winner. Weitz Center Israel international competition on integrated rural development, 2007.

Project reports and communications with ecological sanitation, small farm development and agro-forestry experts in the Philippines and abroad.

Useful websites:

Center for Advanced Philippines Studies (CAPS); www.caps.ph

Solid waste Management Association of the Philippines (SWAPP); www.swapp.org.ph

Sustainable Sanitation Alliance (SuSanA); www.susana.org

EcoSanRes Program of Stockholm Environment Institute (SEI); www.ecosanres.org

Ecosan Program of German Technical Cooperation (GTZ); www.gtz.de/ecosan

Philippine Ecosan Network (PEN); www.ecosan.ph

Ecosan Resource Organizations and Institutions in the Philippines:

Xavier University – Ateneo de Cagayan

Address: Corrales Street, Cagayan de Oro 9000, Philippines

Phone: +63-88-8583116 loc 1103

Website: www.xu.edu.ph & www.puvep.com

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About the Authors

Elmer V. Sayre

Elmer V. Sayre was born in 1959 in a sleepy, farming village of Turno, in Dipolog City, in a family of nine, of near-landless parents eking an existence in farming. In childhood he strived to better his lot through study, hard work and discipline with the goal that in so doing he will in return help the poor and unshod, the lineage where he came from. He was able to study in some of the premier schools by winning scholarships, most notable is a Ph.D. fellowship given by the International Development Research Centre (IDRC) in Canada. His fields are Agricultural Economics (Xavier University, 1980), Extension Administration (Silliman University, 1985) and Community Development (University of the Philippines at Los Banos, 1991). After a teaching stint at Xavier University and Silliman University where he taught subjects in agricultural economics, project planning and rural extension, he decided to work in grassroots areas in Mindanao, where talent and expertise is very much wanting and where poverty, social exclusion and helplessness stare daily. He focused his attention to promote activities related to water system development, agro-forestry, ecological sanitation and rural organizing with emphasis on the poor. To date his work spans three provinces and his initiatives won a number of recognition already (Israel, United States, Philippines). In 2007 he won an Australian Leadership Award enabling him to do research and study at the Australian National University in Canberra. To sharpen his scholarship he wrote about his experiences and spoke to a number of international conferences in Turkey, Vietnam, Germany, Australia and Malaysia. He is married to Cora Zayas, also a social development worker like him and had 2 children. In July-August 2010 he was a scholar-in-residence at the Rockefeller Center in Bellagio, Italy of which much of this book has been written. His hobbies include writing poetry and short stories. He is a published poet and a short story writer.

Jed Christian Zayas Sayre

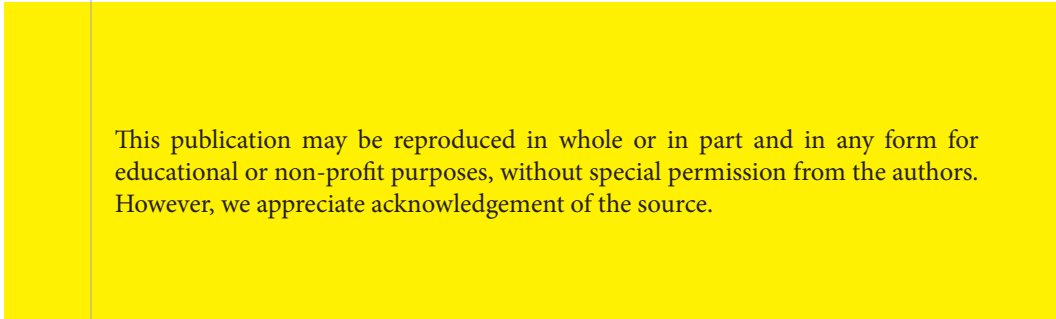
Jed Christian Zayas Sayre at 22 years old is a Municipal Councilor of Libertad Municipality in Misamis Oriental where the Association of Locally-Empowered Youth in Northern Mindanao (ALEY-NM), active in promoting ecological sanitation is based. Jed is a Fellow of the Philippines 21 Young Leaders Initiative of the Asia Society. This is a cross-national engagement of new generation of leaders in the Asia-Pacific region and the US, from across the fields of business, politics, civil-society, media, arts and culture, and academia. He is also an Asia-Pacific Future 100 Fellow for Most Inspiring Entrepreneurs and Social Change-makers. His work in ecological sanitation is funded by the Japan Fund for Water and Idea Wild. He is also the Executive Director of the Tuburan Para Libertad Foundation, Inc. TPLFI provides micro-financing support to local livelihood ventures implemented by the youth and poor artisans as well as he is the Proprietor of Jed's Kofi. Jed's Kofi is locally-made coffee from corn, coffee, moringa and lemon-grass.



The Ateneo School of Government and iBoP-Asia warmly congratulates our partner, WAND Foundation, for making this project a success and the publication of this book possible. This Ecosan project is not only a demonstration of how innovation can help find effective but affordable solutions to some of the pressing problems of the poor in water and sanitation, but it also ties together sanitation, food production and consumption, and presents a viable and innovative paradigm that is practical and adaptable for very poor communities, and most importantly, promotes human dignity, health and food security.

Let us keep the innovation fire burning!

The iBoP-Asia Team



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